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EFFECTIVENESS OF NEONATAL RESUSCITATION SIMULATION (NRS) ON KNOWLEDGE REGARDING NEONATAL RESUSCITATION AMONG NURSING STUDENTS IN SELECTED NURSING COLLEGES

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ABSTRACT
Background: *Every year millions of neonates require breathing assistance immediately after birth. Approximately 10% of newborns demand some assistance in breathing and less than 1% requires extensive resuscitative measures (AHA-2015). Perinatal asphyxia is the major reason to neonatal deaths worldwide. Proficiency of health professionals in neonatal resuscitation is essential in delivery rooms and NICU to safeguard the health of neonates. The present study was conducted to assess the knowledge of nursing students before and after intervention.*
Objective: *The objective of the study was to identify the knowledge of nursing students on neonatal resuscitation before and after Neonatal Resuscitation Simulation (NRS).*
Methods: *It is a true experimental research design to assess the nursing student's knowledge regarding neonatal resuscitation. Pre-test and post-test were conducted with 100 nursing students in the experimental group and 100 in the control group selected by simple random method. The investigator constructed the knowledge questionnaire with 43 items in the form of MCQs.*
Findings of the study: *In the experimental group, the overall mean and SD was 32.4± 4.31 and the overall mean and SD was 17.94± 4.02 in the control group. Computed unpaired "t" value was 24.52 (p < 0.001) which was highly significant.*
Conclusion: *The study findings revealed that the nursing students' knowledge on neonatal resuscitation was inadequate in pre-test. Nevertheless, it was improved after intervention. Hence, the study recommended NRS to the health personnel for improving their knowledge.*
KEYWORDS: Neonatal resuscitation simulation, neonatal resuscitation, nursing students.

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INTRODUCTION

Every year nearly 41% of all under-five child deaths are among newborn infants, babies in their first 28 days of life or the neonatal period (WHO-2011). Neonatal mortality occurs mainly due to perinatal asphyxia, sepsis, prematurity. According to Global Health Observatory (GHO) data, skilled birth attendants could prevent most obstetric complications. Globally almost 80% of live births occurred with the assistance of skilled health personnel in the period of 2012-2017 (WHO-2019). Beginning of natural breathing after birth is the most essential step for the survival of a newborn baby. Skilful Neonatal Resuscitation **(NR)** has the capacity to prevent these perinatal mortalities related to birth asphyxia. Organised knowledge and recognising the time to undertake resuscitation procedure in the neonate is essential for reducing the number of complications in newborns. Deficiency in proper resuscitative care leads to high neonatal mortality which is preventable.

PURPOSE OF THE STUDY

The purpose of the study was to identify the knowledge of nursing students before and after Neonatal Resuscitation Simulation (NRS). This study could help the nursing students gain knowledge to undertake neonatal resuscitation procedures in emergency and could reduce the complications in life-threatening situations.

OBJECTIVES OF THE STUDY

- To determine the pre-test level of knowledge of nursing students on neonatal resuscitation.
- To develop and implement simulation teaching (NRS) on neonatal resuscitation.
- To evaluate the effectiveness of Neonatal Resuscitation Simulation (NRS) in terms of gain in level of knowledge score.

MATERIALS AND METHODS

Research Design: The investigator adopted a true experimental design to observe the changes that take place in cause and effect relationship. A true experimental study is characterised by its properties like manipulation, control and randomisation.

Research setting and population: The study was carried out in selected nursing colleges located in Tirunelveli District of Tamil Nadu. The study population was 4th year undergraduate nursing students.

Sampling technique: Sampling technique of this study was simple random technique, which comes under probability sampling wherein the elements are selected at random. A total of 200 nursing students who were studying in 4th year B.Sc. (nursing), were selected.

Description of the Instrument —

Socio-Demographic Data: It was developed according to the needs of the current study by the investigator i.e. age of the student; gender of the student; number of times neonatal assessment performed in hospital; number of times participated in the team of neonatal resuscitation and source of knowledge on neonatal resuscitation.

Knowledge questionnaire: The investigator developed the items based on the blueprint and selected Multiple Choice Questions (MCQ) format. Totally 43 questions were constructed of which six items related to the introduction of neonatal resuscitation; preliminary assessment contained eight items with three items on care of newborn during resuscitation, three items on airway, seven items on ventilation, six items on chest compressions on neonatal resuscitation; administration of medication consisted of three items and care after NCPR contained five items.

Data collection procedure: After obtaining written permission from the institutions, written informed consent was taken from the student participants. Demographic data was collected first and then the knowledge questionnaire was issued and collected. After that, Neonatal Resuscitation Simulation (NRS) teaching was imparted with the help of infant mannequin. After 2 weeks of intervention, post-test was conducted with the same questionnaire. The data collection time with the questionnaire was approximately 30 -35 minutes.

Statistical Analysis: Descriptive and inferential statistics were used for analysing the data. Data was analysed in Statistical Package for Social Science (SPSS) 16 version.

RESULTS

Table 1: Frequency and percentage wise distribution of demographic variables of nursing students

Sl. No,	Demographic data		Control group (n=100)		Experimental group (n=100)	
			f	%	f	%
1.	Age (in years)	19 years	0	0	0	0
		20 years	95	95	88	88
		21 years and above	5	5	12	12
2.	Gender	Male	0	0	0	0
		Female	100	100	100	100
3.	Number of times neonatal assessment performed :	1-5 times	5	5	9	9
		6-10 times	0	0	2	2
		More than 10 times	0	0	0	0
		Did not perform	95	95	89	89
4.	Number of times participated	1-5 times	2	2	9	9
		More than 5 times	0	0	2	2
		None	98	98	89	89
5.	Source of knowledge	Academic	95	95	89	89
		Clinical experience	5	5	9	9
		Seminars/workshops	0	0	1	1
		Web pages	0	0	1	1

Table - 1 shows that 95% of control group and 88% of experimental group belonged to the age group of 20 years. 5% in control group and 9% in experimental group performed neonatal assessment 1-5 times and 95% in control group and 89% in experimental group did not perform neonatal assessment. Only 2% in control group and 9 % in experimental group participated in neonatal resuscitation. Source of knowledge of majority of nursing students in the control group (95%) and experimental group (89%) was through their academic performance.

Table - 2: Frequency and percentage of control and experimental group level of knowledge on neonatal resuscitation   **N= (100+100)= 200**

Level of knowledge	Control group				Experimental group			
	Pre-test Score		Post test score		Pre-test Score		Post-test score	
	f	%	f	%	f	%	f	%
Poor	25	25	19	19	31	31	0	0
Average	75	75	80	80	69	69	19	19
Good	0	0	1	1	0	0	81	81
Total	100	100	100	100	100	100	100	100

Table 2 presents that in pre-test, 69% of experimental group and 75% of control group had average levels of knowledge on neonatal resuscitation. 31% of experimental group and 25% of control group had poor knowledge before the implementation of NRS. In post-test, 81% of the experimental group had good knowledge level and 19% had average knowledge level. In control group, majority 80% had average knowledge level, 19% had poor knowledge level and 1% had good knowledge on neonatal resuscitation.

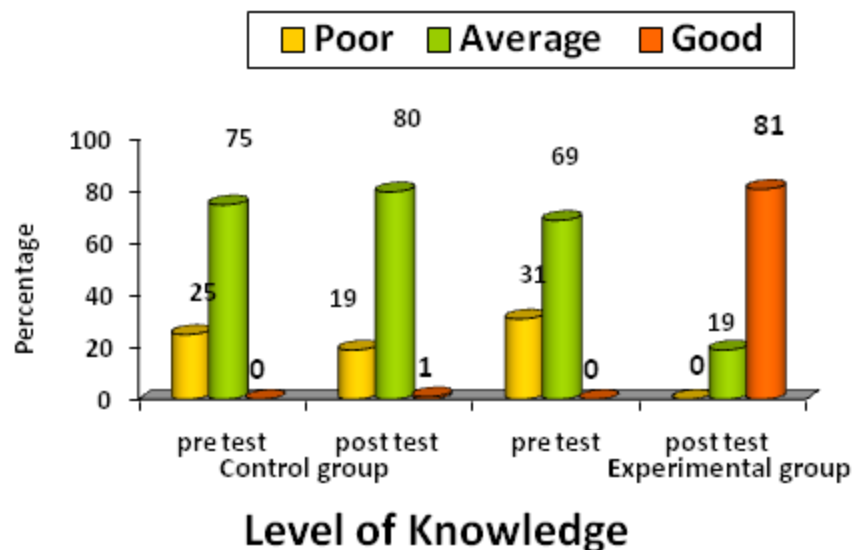**Percentage of samples based on Pre-test and Post-test Levels of Knowledge**

Figure - 1: Level of knowledge scores before and after implementation of NRS

Figure - 1 cylinder diagram shows that in pre-test, highest percentage of them in experimental group (69%) and in the control group (75%) had average knowledge; whereas, 31% in experimental group and 25% in control group had poor knowledge. In post-test, 81% of experimental group had good knowledge and 19% had poor knowledge; whereas, 80% had average knowledge and 19% had poor knowledge in the control group. From the findings, it can be interpreted that NRS improved the level of knowledge among nursing students significantly higher in experimental group than in the control group.

Comparison of Pre-test and Post-test knowledge scores —

Comparison in pre-test of Mean, SD and Mean % of knowledge: Out of maximum achievable score of 43 in the experimental group, the overall mean and SD was 16.73± 4.05, which is 39% of total score. The overall mean and SD was 17.3 ± 4.01 in the control group, which was 40% of total score. In both the groups, the pre-test knowledge scores revealed poor knowledge before implementation of NRS on neonatal resuscitation. **The data is also presented in line graph format as shown in Figure - 2**
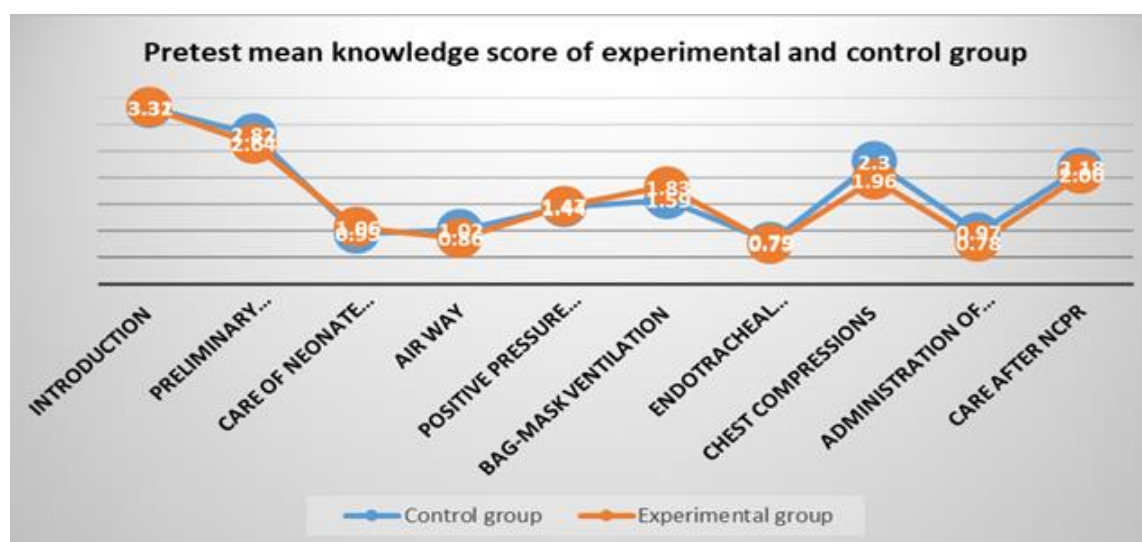

Figure - 2: Line graph showing the Pre-test mean knowledge score of Experimental and Control group

Comparison in Post-test of Mean, SD and Mean % of knowledge: Out of maximum attainable score of 43, the overall mean and SD was 32.4± 4.31, which is 75% of total score in the experimental group and the overall mean and SD was 17.94± 4.02 in the control group, which is 42% of total score. The data is presented in line graph below —

Figure - 3: Line graph showing the Post-test mean knowledge score of experimental and control groups.

Table - 3: Paired 't' test to assess the efficacy of NRS on knowledge among nursing students

N= (100+100) = 200

Knowledge	Experimental pre- test		Experimental post- test		Mean difference	't'- value	P-value
	Mean	SD	Mean	SD			
Introduction	3.32	1.14	4.83	1.11	1.51	9.97	P<0.001***
Preliminary assessment of newborn	2.64	1.57	5.41	1.66	2.77	13.05	P<0.001***
Care of neonate during resuscitation	1.06	0.74	1.84	0.77	0.78	7.23	P<0.001***
Air way	0.86	0.83	2.6	0.57	1.74	17.2	P<0.001***
Positive pressure ventilation	1.47	0.94	1.93	0.79	0.46	3.40	P<0.001***
Bag-mask ventilation	1.83	0.93	3.17	0.65	1.34	11.76	P<0.001***
Endotracheal intubation	0.75	0.51	1.46	0.64	0.71	8.92	P<0.001***
Chest compressions	1.96	1.18	4.79	0.96	2.83	18.56	P<0.001***
Administration of medication	0.78	0.62	2.59	0.63	1.81	20.74	P<0.001***
Care after NCPR	2.06	1.06	3.78	0.97	1.72	12.61	P<0.001***
OVEALL	16.73	4.05	32.4	4.31	15.67	26.84	P<0.001***

Table-3 describes the overall knowledge Mean, SD was 16.73± 4.05 in the pre-test experimental group and the Mean, SD was 32.4± 4.31 in post-test experimental group. The mean difference between pre- and post-test of experimental group was 15.67 and obtained paired "t" value for experimental group was 26.84 (p < 0.001) which was highly significant.

Table 4: Unpaired 't' test to assess the Post-test efficacy of neonatal resuscitation simulation (NRS) on knowledge between control and experimental groups among nursing students

N = (100+100) = 200

Knowledge	Control Post-test		Experimental post-test		Mean difference	't'-value	P-value
	Mean	SD	Mean	SD			
Introduction	3.33	1.14	4.83	1.11	1.5	9.39	P<0.001***
Preliminary assessment of newborn	2.71	1.58	5.41	1.66	2.7	11.75	P<0.001***
Care of neonate during resuscitation	1.1	0.75	1.84	0.77	0.74	6.88	P<0.001***
Air way	1.52	0.70	2.6	0.57	1.08	11.94	P<0.001***
Positive pressure ventilation	1.44	1.38	1.93	0.79	0.49	3.06	P=0.002**
Bag-mask ventilation	1.53	1.09	3.17	0.65	1.64	12.85	P<0.001***
Endotracheal intubation	0.94	0.73	1.46	0.64	0.52	5.32	P<0.001***
Chest compressions	2.08	1.63	4.79	0.96	2.71	14.25	P<0.001***
Administration of medication	0.91	0.86	2.59	0.63	1.68	15.63	P<0.001***
Care after NCPR	2.38	1.36	3.78	0.97	1.4	8.37	P<0.001***
OVEALL	17.94	4.02	32.4	4.31	14.46	24.52	P<0.001***

Table-4 depicts that, the overall mean and SD was 32.4± 4.31 in the experimental group and the overall mean and SD was 17.94± 4.02 in the control group. The overall mean difference between pre-test and post-test was 14.46 and the obtained unpaired "t" value was 24.52 (p < 0.001) which was highly significant. It clearly indicates that the mean post-test knowledge score of nursing students on Neonatal Resuscitation in the experimental group will be significantly higher than that of post-test control group as measured by structured knowledge questionnaire on Neonatal Resuscitation.

DISCUSSION

In the experimental group, the mean post-test knowledge score was 32.4± 4.31 which was significantly higher than in the pre-test knowledge score of 16.73± 4.05 with the computed paired "t" value of 26.84 (p< 0.001) being highly significant compared to control group. The computed post-test unpaired "t" value (t= 24.52, p<0.001) was highly significant compared to pre-test unpaired "t" value of (t= 1.12, p> 0.001). The findings of the present study exhibit that the post-test knowledge was significantly improved than in the pre-test. These results explain that the knowledge score of experimental group was significantly higher than that in the control group. Hence, H_{01} is rejected and H_1 is accepted. Thus, it is concluded that STM is effective in terms of gain in knowledge score.

Similar findings were also reported by Karakoc A, Demirgoz M, Bingol FB and Aslan B (2019) as in the present study since the differences in the mean total scores and all sub-dimension scores were found to be significant in favour of the experimental group, the score being 95.17 ± 2.13 there, as against in the control group where it was 61.27 ± 8.12 after the intervention of simulation based training. These findings were consistent with the present study findings.

Subbiah N, Sarin J, Jeeva S and Geetanjali (2012) conducted an interventional study on neonatal resuscitation to assess the pre- and post-test improvement of knowledge. The study findings revealed that the mean pre-test knowledge (19.11± 0.21) was less than the mean post-test knowledge (30.71± 0.21) and the difference was statistically significant (t= 23.5, p<0.05). These results are consistent with the findings of the present study proving effectiveness of intervention.

CONCLUSION

Before intervention with Neonatal Resuscitation Simulation (NRS), the nursing students had poor knowledge on neonatal resuscitation. After implementing NRS, the knowledge level was good in experimental group. Hence, NRS is essential to improve the knowledge of nursing students for providing quality nursing care to the neonates thereby reducing mortality and morbidity during their complicated life-threatening situations.

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